FINAL STATEMENT OF REASONS
FOR THE
BUILDING ENERGY EFFICIENCY STANDARDS
ADOPTED BY THE
CALIFORNIA ENERGY COMMISSION
ON NOVEMBER 5, 2003

CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 1 AND PART 6

UPDATES TO THE INITIAL STATEMENT OF REASONS

None.

MANDATE ON LOCAL AGENCIES OR SCHOOL DISTRICTS

The Energy Commission has determined that the proposed regulatory action WOULD NOT impose a mandate on local agencies or school districts.

Public Resources Code § 25402.1 obligates local building departments to serve as enforcement agencies for the Standards.

The Standards contain energy efficiency requirements for schools. Enforcement of the Standards for public school buildings is required by Title 24, Part I administrative regulations of the Division of State Architect. The Standards add requirements for schools that are the same as those applicable to all nonresidential buildings. The Standards also recognize the unique characteristics of relocatable public school buildings and establish requirements and procedures to facilitate compliance and enforcement for relocatables. The Standards for schools are cost effective and will reduce the costs of building and operating school buildings over their useful life.

OBJECTIONS OR RECOMMENDATIONS MADE REGARDING THE PROPOSED REGULATIONS(S)

Comments Resulting in 15-Day Language Revisions

General

In his comments at the September 4, 2003, Committee hearing, Mr. Stephen Yurek, representing the Air Conditioning and Refrigeration Institute (ARI), noted that the publication dates for referenced ARI standards were not the most current. The Energy Commission made these corrections in Section 101(b) and Appendix 1-A of the Standards and in Joint Appendix I.

Editorial Comments and Typographical Error Corrections

Mr. Eric DeVito, representing Cardinal Glass, pointed out at the September 4 hearing that the 45-day language strikeouts and underlines in Section 152(a) 1 A did not make sense. The Energy Commission removed the words “Table 151 C the” to correct this.

Mr. David Ware of Owens Corning and the North American Insulation Manufacturers Association (NAIMA) offered a technical correction regarding insulation and ventilated crawl spaces. At the November 5 adoption hearing, he suggested changing the term “mineral wool” to “mineral fiber” in the Residential ACM Manual, Section 6.2.4. The Energy Commission edited the section to make this change.

Mr. Pat Splitt of AppTech, at the September 4 hearing, recommended striking the word “entire” in Sections 146 (b) 2 and 146 (b) 3 and in Exception 2 to Section 146 (b) 3 for clarity. The Energy Commission made this change. Mr. Splitt also pointed out at the September 4 hearing that the word "horizontal" should be deleted from Section 146 (b) 3 A i because it is inconsistent with the Illuminating Engineering Society of North America (IESNA) Lighting Handbook that the section references. The errata proposed for CBSC approval corrects the reference.

Mr. John Page representing LSI Industries and Jeffrey Aran representing the California Sign Industry at the September 4 hearing requested amendment of Section 149 to clarify that the changing of only lamps and ballasts does not trigger outdoor lighting alteration requirements. The Commission added a note to Section 149 (b) 1 to make this clarification.

Mr. Mitch Gutell representing BP at the September 4 hearing requested clarification of Section 149 (b) 1 I regarding how 50 percent replacement of existing lighting fixtures is determined to trigger alteration requirements. The Energy Commission made this clarification.

Mr. David Greeley of Dow Chemical Canada, in his letter dated October 3, 2003, caught a typographical error in the Standards Table 118-A, Insulation Requiring Certification to Standards for Insulating Materials. The insulation material polystyrene was listed in this table as being in “Board form, molded extruded.” Mr. Greeley pointed out the polystyrene is either molded or extruded. The Energy Commission added the word “or.”

Mr. Greeley also requested correction of an editorial error: Standards Section 118(h) states that the effective R-value of certain roof insulation is specified in Appendix IV of the Nonresidential ACM Manual, but there is no Appendix IV in the 2005 Nonresidential ACM Manual. The errata proposed for CBSC approval corrects the reference to Appendix IV of the Joint Appendices.

Mr. Greeley pointed out that the 2 inch by 4 inch framing type was incorrectly listed as 5.5” thick in Table IV.3 in Joint Appendix IV, that Table IV.12 provided no definition for the term “insulated” used therein, that Table IV.13 had no definition of the term “Ru” used therein, and that Table IV.14 had a typographical error in Row 1, Column K. The Energy Commission reformatted and replaced these tables and eliminated these problems.

Mr. Steven Yurek of ARI noted in a letter dated November 3, 2003, that Tables 112 A and B in the Standards incorrectly list ARI 210/240-2003 as the test procedure for air-cooled air conditioners and heat pumps between 65,000 and 135,000 btu/h. The correct test procedure is ARI 340/360-2000. The Energy Commission made this change.

Mr. Gary Farber sent an email dated October 29, 2003, asking if the definition of “kitchen” in Section 101(b) was limited to the low-rise residential sector and if not, to delete the word “low-rise” in the definition. The Energy Commission clarified that the definition applies to the other building sectors as well and deleted “low-rise” from the definition.

In the same email, Mr. Farber noted in Section 152(a)2B, the wording was incorrect in saying that improvements must meet the prescriptive requirements of Section 152(b)1. The Energy Commission resolved this by referencing Section 152(b)2 instead of 152(b)1.

Scope

In an email dated October 30, 2003, Mr. Tom Winter representing the State Historical Building Safety Board (SHBSB) stated that the proposed Standards 15-Day Language was in conflict with Health and Safety Code Section 18959 (b), which removes any discretion from the enforcing agency about enforcing the SHBC. The SHBSB believed that the proposed Standards changes

gave that discretion back to the "building official." The Energy commission resolved the matter by not adopting the proposed changes.

Home Energy Rating System (HERS) Provider Notification

At the September 4 hearing, Mr. Pat Splitt of AppTech, Mr. Bill Mattinson of the California Association of Building Energy Consultants (CABEC), and Mr. Michael Day of Rockwood Consulting expressed concern with a proposal in the Residential ACM Manual Section 7.4 requiring the energy consultant who completes the compliance documentation to notify a HERS provider if the building compliance requires third-party verification, while Mr. Nehemiah Stone of Heschong Mahone Group and Mr. Jeff Chapman of California Living & Energy believed that it was not a problem. Mr. Splitt argued that the builder who is responsible for the building should be required to notify the HERS provider. Mr. Splitt was also concerned about which HERS provider should be notified. At the same hearing, Mr. Ken Nittler of EnerComp, echoed by Mr. Chapman at the hearing and by Mr. Mattinson in a September 3 letter, suggested a related approach: that Section 10-103 (e) 2 of the Administrative Regulations state that the building department not approve a dwelling unit for occupancy until the department has received a certificate of field verification and diagnostic testing signed and dated by the HERS rater.

The Energy Commission decided to delete the requirement in the Residential ACM Manual, Section 7.4, and the Nonresidential ACM Manual, Section 7.9.1 and 7.9.5 that the energy consultant notify a HERS provider. The Energy Commission added Mr. Nittler's suggestion in Section 10-103 (e) 2 of the Administrative Regulations.

At the November 5 adoption hearing, Mr. Mattinson pointed out that language related to HERS provider notification in Section 7.8.4 of both the Residential and Nonresidential ACM Manuals had been left in by mistake. The Energy Commission agreed and removed the erroneous language.

Ducts Buried in Attic Insulation

Mr. David Ware of Owens Corning and NAIMA misunderstood the proposal for the R-value of ducts buried under attic floor insulation in the Residential ACM manual, and as a result of his comments at the September 4 hearing and in his September 7 letter, the Energy Commission substantially rewrote and clarified the language in Section 4.8.5.

Ventilation

At the September 4 Committee hearing and in his August 27 letter, Mr. Pat Splitt of AppTech suggested adding a reference to the California Building Code into Section 121(a)1 for its ventilation requirements. The Energy Commission added this reference. Mr. Splitt also suggested deleting a note in this section that made a recommendation, rather than stating a regulation, regarding ventilation of certain contaminants. The Energy Commission deleted the note.

For Sections 121(b)2A and B, Mr. Splitt suggested changes he felt clarified the ventilation requirements for mechanically ventilated spaces. The Energy Commission agreed that a clarification was needed and re-wrote the section similar to what Mr. Splitt suggested.

Ductless Space Conditioning Systems

In a letter dated August 27, 2003, and at the September 4 Committee hearing, Mr. Pat Splitt of AppTech requested clarifying language on ductless HVAC systems. For the prescriptive residential Section 151(f)10, he suggested changes to clarify that when a space conditioning system has no ducts, it is considered to meet the package requirements for duct sealing. The Energy Commission added his suggested language.

Cooling Towers

Mr. Tom Bugler of EVAPCO sent a letter dated September 4, 2003, with his concerns about requirements for certification of cooling tower performance by the Cooling Tower Institute (CTI). Suggestions for resolving these concerns were made by Mr. Jim Furlong of Baltimore Aircoil Company in an email dated September 29, 2003. The Energy Commission accepted his suggestions and added language in Table 112-G in the Standards on CTI cooling tower certification. This resolution of the issue was supported by Mr. Bugler and Mr. Paul Lindahl of Marley Cooling Technologies, Inc., in emails dated October 1, 2003 and September 29, 2003, respectively.

Limitation on Air-Cooled Chillers

Mr. Steve Yurek representing ARI spoke at the September 4 Committee hearing and expressed concern with the proposed limitation on tonnage of air-cooled chillers in Section 144(i). In response to this concern, the Energy Commission added Exception 3 to Section 144(i) allowing a prescriptive approach for larger air-cooled chillers with minimum efficiencies to be approved through the Commission as a compliance option.

Air Conditioner Compressor Sizing

Mr. Mike Hodgson representing the California Building Industries Association (CBIA) expressed concern at the September 4 hearing regarding the Residential ACM Manual's Section 4.7.2, Compressor Sizing. Mr. Hodgson asked for clarification that the section was not a mandatory restriction on air conditioner sizing. As a result of CBIA's comments, the Energy Commission further clarified this section, which is a compliance option rather than mandatory.

Space Conditioning Alterations

Mr. Jim Mullen of Lennox spoke at the September 4 Committee hearing on the Standards nonresidential prescriptive requirements in Section 149(b)1E. This section requires duct sealing when space conditioning equipment is replaced. There was a proposed exception to Section 149(b)1E for installations or replacements of only the outdoor condensing unit of split system air conditioners or heat pumps. Mr. Mullen requested the removal of this exception because he believed that the exception would encourage replacement of just the outdoor unit, creating an unmatched set where the outdoor unit would be new and efficient while the indoor unit would remain older. The efficiency of the system as a whole would suffer, and the ducts would remain leaky. The Energy Commission agreed and deleted the exception.

Nonresidential Heat Pump Modeling

Mr. Pat Splitt of AppTech raised a concern at the September 4 hearing and in a letter dated August 27 that the current Nonresidential ACM Manual does not correctly model heat pump electric resistance heaters correctly. It assumes that no more than 25% of required heating energy at design conditions will be provided by auxiliary electric heater elements, regardless of the amount of energy actually expended to provide heat at winter design conditions. The Energy Commission carefully reviewed Mr. Splitt's concerns and developed amendments to Sections 2.5.2.6 and 2.5.2.7 to address the concerns.

Porous Inner Core Ducts

The Energy Commission initially proposed a Standards change in Sections 124(g) and 150(m)10 that would disallow the use of porous inner core flex duct in residential and nonresidential buildings. However, the Commission subsequently concluded that disallowing porous inner core

flex duct was reasonable for residential buildings but not for nonresidential buildings. At the September 4 hearing, Mr. David Ware expressed his support for this change on behalf of Owens Corning and NAIMA.

Nonresidential Air Conditioning Outdoor Design Temperatures

The Energy Commission also proposed to change the nonresidential provisions for air conditioning outdoor design temperatures in Section 144 (b) 4 to match changes for residential buildings, but upon reconsideration the Commission decided that was not an appropriate change. Mr. Karl Brown of the University of California/California Institute for Energy Efficiency sent an email to staff September 3, 2003, supporting keeping the same nonresidential outdoor design conditions as in the 2001 Standards.

Acceptance Requirements for Economizers

Mr. Jim Mullen of Lennox at the September 4 hearing asked for clarification of what he believed to be certification requirements for air economizers installed in air conditioning equipment at the factory. He wanted to find out where the certification requirements were listed. The Energy Commission responded that the provisions that Mr. Mullen was asking about are in the Exception to Section 125 (b), wherein the Standards provide the option for manufacturers to do the acceptance requirements testing in the factory and certify that they have done so to the Commission, instead of the requirement that the testing be done by the installer in the field. The testing requirements are covered in Appendix NJ of the Nonresidential ACM Manual. Mr. Mullen suggested adding that reference into the text of the Standards. The Energy Commission added a reference to the Nonresidential ACM Manual in Section 125 (b).

Residential High Quality Insulation Installation

Mr. David Ware of Owens Corning and NAIMA commented at the September 4 hearing that the rules about fixing voids in fiberglass batt insulation when installed in walls and ceilings should also apply to blown and sprayed insulation. He submitted corrective language, which the Energy Commission incorporated into Section RH2 of Appendix RH of the Residential ACM Manual.

In a letter dated September 7, 2003, Mr. Ware continued his comments on insulation installation quality. For raised floors and floors over garages, he suggested adding that the insulation facing of faced insulation must be in contact with the underside of the floor sheathing. The Energy Commission incorporated this idea and expanded it for completeness in Section RH3 of Appendix RH of the Residential ACM Manual.

Also in his September 7 letter, Mr. Ware expressed concern about the Residential ACM Manual Appendix RH not addressing insulation installation problems around non-insulation contact (IC) rated recessed light fixtures in additions or alterations. The Energy Commission added clarifying language in Residential ACM Manual Sections RH 5.1.1 and 5.2.1 that Appendix RH does not apply to cases where non-IC fixtures are installed, and in such cases to qualify for compliance credit for quality insulation installation, the fixture must be replaced or eliminated.

Residential Hot Water Pipe Insulation

The Energy Commission received several comments on the proposed requirement to insulate all hot water piping in residences from the heating source to the kitchen in Section 150 (j) 2. At the November 5 adoption hearing, Mr. Mike Hodgson of CBIA stated that CBIA's analysis showed this measure to not be cost-effective. In his November 4 letter, Mr. Dave Ware of Owens Corning and NAIMA recommended that the proposed Standards exception for pipe insulation when pipes are buried under attic insulation should apply equally to batt insulation as to blown insulation. Mr.

Norman Sorensen of the California Department of Housing and Community Development (HCD), in his letter dated September 23, found the requirement to be unclear because it didn't specify to what point in the kitchen the insulation should be installed.

The Energy Commission's research and thorough review of CBIA's input led the Commission to conclude that hot water pipe insulation is cost effective in specific situations. The Commission found that to be the case for hot water pipes from the heating source to the kitchen that are ¾ inches or greater in diameter. The Commission concluded that it is not necessary to have pipe insulation on pipes that are buried under attic insulation, agreed with Mr. Ware's comment that this conclusion applies equally to batt insulation as to blown insulation, and made that clarification in the Standards. The Commission also concluded that pipe insulation is not necessary in walls that have insulation installed to meet the insulation quality installation compliance credit procedures. The Commission changed the proposed requirement to be prescriptive (moved to Section 151 (f) 8 D) rather than mandatory and changed it to require insulation only in those cases where the Commission concludes that it is cost effective (see also Exceptions to Section 150 (j) 2). In making this change the Energy Commission also responded to Mr. Sorensen's comment by clarifying that the insulation is to be installed to each applicable kitchen fixture or to the end of pipe runs for pipes that are ¾ inches in diameter or greater.

Mandatory Insulation Requirements

Mr. David Greeley of Dow Chemical Canada in a letter dated October 3, 2003, suggested clarifications for Standards Section 118(g) 1 B and Section 150 (l) 1. For heated slab floor insulation, Mr. Greeley wanted clarification to ensure that only insulation core material would be tested to meet the specified water absorption rate. He also wished to specify the test method and duration. The Commission made these changes.

Mr. Greeley also commented on the 45-day language regarding wet insulation systems. He pointed out that there was an error in this language in that Section 118(h) referred to Joint Appendix IV (JA-IV), but the referenced information was missing in JA-IV. The intent of the 45-day language for these sections was to adjust by a factor of 0.80 in every climate zone the R-value for roof insulation installed above the waterproof membrane to account for it becoming wet and less effective. He also recommended that the R-value not be reduced uniformly throughout the state because of field research that shows that the phenomenon applies only in climates that are both cold and get high levels of annual rainfall. The Energy Commission agreed with Mr. Greeley and revised JA-IV to require adjustment of the R-value only in the two cold, wet climate zones 1 and 16.

Cool Roofs

Mr. Rob Stannard of Gardner Industries sent an email on October 30, 2003, regarding liquid-applied cool roof coatings. The standards' Section 118 (i) 3 specifies the thickness and minimum performance requirements for such coatings. A subset of these coatings, aluminum-pigmented asphalt roof coatings, was proposed by the Energy Commission to be exempted from these requirements but required to meet the American Society for Testing and Materials (ASTM) D2824. Mr. Stannard's email requested adding a reference to ASTM D6848 to the existing reference ASTM D2824. The Energy Commission added ASTM D6848, which applies to lower VOC roof coatings than those covered under ASTM D2824, to Section 118(i)3, to the definitions section 101(b) of the Standards, to Appendix 1-A, and to Joint Appendix I.

Construction Assemblies

Mr. David Greeley of Dow Chemical Canada had a number of comments on the standard construction assemblies of Joint Appendix IV (JA IV) in his letter of October 3, 2003. Mr. Greeley

was concerned that the construction assemblies proposed in the 45-day language did not cover enough assemblies, and that the exceptional method approval process would be too cumbersome for approving additional assemblies. He also pointed out a number of deficiencies in the tables in JA-IV.

Mr. Mike Gabel representing CABEC spoke at the September 4 Committee hearing concerning replacement of U-factor calculations in the field (form 3) with the standard construction assemblies in JA-IV in the proposed standards. He expressed the opinion that not all assemblies could be covered in JA-IV and that there needed to be some option for calculating the U-factors of unique assemblies in the field, assuming that there will be restrictions in the use of that calculation option as well as requirements for defaulted assumptions.

At the September 4 hearing, Mr. Mike Hodgson of CBIA supported the approach of replacing U-factor calculations in the field with standard assemblies in JA-IV. He also supported the approach of Executive Director approval of assemblies that are outside of the JA-IV process. He volunteered assistance from CBIA to communicate the new process to product manufacturers after adoption to make them aware of the approval of unique assemblies process.

The Energy Commission revised JA-IV to provide for approval by the Executive Director of additional assemblies (Section IV.1.1). The Commission did a major rewrite of JA-IV, adding assemblies, correcting values and making the tables more clear and easy to use. The Commission included a process in Section IV.1.2 to allow for adjustment of JA-IV U-factor values using Energy Commission approved computer software that makes these adjustments using specific procedures. There was no opposition to the revisions.

Mr. Ken Nittler of Enercomp at the September 4 hearing suggested that Joint Appendix IV include, on materials that have mass, documentation of what the thermal conductivity and the heat capacity per cubic foot is. The Energy Commission added this information in JA-IV.

Outdoor Lighting Power Allowances and Lighting Zones

The Energy Commission received many comments related to the proposed 45-day language regarding the inter-related topics of outdoor lighting power allowances and lighting zones in Sections 147, 148, 149 (b) and 10-114. Ms. Cheryl English of Acuity Brands Lighting Group at the September 4 hearing and in a letter dated September 2 expressed concerns with the proposed 45-day language changes regarding the lighting power allowances for the four proposed lighting zones. She said that she supported the lighting zone concept and that it made sense for lighting levels and lighting power density to be designed based on the regional needs for illumination in that area. However, she thought that the Energy Commission's definitions of the outdoor lighting zones (LZ) (Section 10-114) were inconsistent with the definitions of the Illuminating Engineering Society of North America (IESNA) and the International Commission on Illumination (Commission Internationale de l'Eclairage - CIE). In an attachment to her letter she quoted the definitions in IESNA's Recommended Practice RP-33-99: Zone 1 - Areas with intrinsically dark landscapes; Zone 2 - Areas of low ambient brightness; Zone 3 - Areas of medium ambient brightness; Zone 4 - Areas of high ambient brightness. Neither IESNA nor CIE provides more specific definitions but they do provide some examples to help designers interpret the intent. She included examples of types of areas in each zone that are provided by IESNA and CIE (see table below).

Lighting Zone Definitions and IESNA and CIE Examples

Zone	Definition	IESNA Examples	CIE Examples
1	Intrinsically Dark	National parks; areas with outstanding natural beauty, residential areas where inhabitants have expressed strong desire that all light trespass be strictly limited	Natural parks or protected sites
2	Low Ambient Brightness	May be outer urban and rural residential areas	Industrial or residential rural areas
3	Medium Ambient Brightness	Generally urban residential areas	Industrial or residential suburbs
4	High Ambient Brightness	Normally urban areas having both residential and commercial use and experience high levels of nighttime activity	Town centers and commercial areas

She found the Energy Commission's setting of default lighting zones (Lighting Zone 1 - Government designated parks, recreation areas and wildlife preserves; Zone 2 - Rural areas as defined by the 2000 Census; Zone 3 - Urban areas as defined by the 2000 Census; Zone 4 - Special districts designated by a local government for high intensity nighttime use) as not consistent with the IESNA/CIE definitions. She endorsed completely the concept of allowing the community to decide local designations for Zone 4. However, she expressed concern that the 45-day language limited the local government's designations in two ways: 1) that locally adopted zones would be allowed to be only one zone higher than the statewide default zone designations (e.g., Zone 2 statewide default designations could only be changed by local decision to Zone 3 not Zone 4); and 2) that locally adopted zone designations could be made only for a maximum of 20% of the dry land area in the jurisdiction. She recommended that those constraints be dropped. She thought that designations based on census data would be difficult for local building departments to enforce. She further said that the Energy Commission's approach could work, but that the lighting power densities for Zone 3 in the 45-day language would need to be revised.

Ms. English stated that power density limits need to be carefully set to support nighttime visibility and security needs. She said, however, that security requirements have been difficult to define. She pointed out that there is a new IESNA document, IESNA G-1-03, *Guideline for Security Lighting for People, Property and Public Spaces*, now available that defines guidelines for security. The new guideline has illumination recommendations for specific outdoor lighting security locations. She said that there is an opportunity to achieve significant energy reductions in outdoor lighting while supporting these security lighting guidelines. She recommended that the lighting power densities proposed in the 45-day language be reconsidered in light of the new security guidelines. Related to lighting power densities for gas stations, Ms. English said that Mr. Jim Benya, the Commission's primary consultant on the outdoor lighting standards, did an excellent job in developing the models and providing the detail. She said that she believes that the models that have been redesigned can achieve the appropriate power densities that are proposed to meet the IESNA recommended illumination levels for gas stations. The new numbers are going to meet the need.

Mr. John Page of LSI Industries at the September 4 hearing and in a letter dated September 3 expressed concerns about the 45-day language proposals for lighting power densities and lighting zones. He said that many of their concerns were identical to those raised by Ms. English. He misunderstood that the requirement in Section 149 (b) 1 H would mean that whenever gas

stations "touch" 50% of their lights that the entire lighting system would have to be replaced with equipment that meets the Standards. The Commission clarified that the requirement would apply only when entire luminaires are replaced and would not apply to situations where the lamps or ballasts in existing luminaires were upgraded. Mr. Page said that the lighting power densities for gas station lighting needed to be reviewed to make sure that they were high enough to meet the IESNA recommended illumination levels for each lighting zone assuming efficient equipment was used.

Mr. Steven Arita of the Western States Petroleum Association (WSPA) at the September 4 hearing and in a letter dated September 18 expressed concerns about the 45-day language provisions related to gas stations. He said that the proposed lighting power densities would cause lower illumination levels that would raise safety and security concerns. He also thought that the proposed requirements in Section 149 (b) 1 H would cause light levels to go down for existing gas stations and would discourage lighting upgrades.

Mr. Mitch Gutell of BP also expressed concerns at the September 4 hearing with the proposed 45-language provisions for gas stations. He agreed with Mr. Page that the proposed lighting power densities needed to be reviewed to make sure that they were high enough to meet the IESNA recommended illumination levels in each lighting zone using pulse start metal halide lamps. He said that BP also was concerned about crime reduction associated with gas stations and that lighting illumination levels needed to be high enough to provide worker and customer safety. He said that the concept of lighting zones was a good one to create appropriate lighting requirements for each region. A rural area would not need the same brightness and illumination as Los Angeles. He suggested making the lighting zones tie in with existing land use planning zone designations even though those might vary from community to community.

Dr. Mark Morgan of 7-Eleven, Inc., in a letter dated September 4 expressed similar concerns with the proposed 45-day language provisions. He misunderstood the proposed provisions, believing that the Standards would require existing gas station canopies to be completely redesigned, creating the high cost of rewiring, followed by patching and repainting the canopy. He thought that the proposed 45-day language focused too much on lighting intensity and would detrimentally impact safety and liability. He also did not think that the proposed 45-day language was adequately supported. The letter appeared to be based on the same analytical concerns that Mr. Page and Mr. Gutell raised.

Mr. Timothy Feldman of the National Electrical Manufacturers Association (NEMA) in a letter dated October 1 also expressed concern with the proposed 45-day language. He said that the proposed lighting power densities were not consistent with lighting security guidelines published by IESNA. He also said that the lighting zone classifications of IESNA should be kept without modification. He did not support the approach of local government designation of lighting zone 4 areas.

Mr. Gary Fernstrom of Pacific Gas and Electric Company at the September 4 hearing expressed support for the proposed outdoor lighting provisions. He pointed out that the Standards establish lighting power densities (a measure of energy consumption) not the light level. He said it was entirely possible through the use of more efficient sources to get greater brightness at the same lighting power density. If particular users were dissatisfied with the levels of light that they could achieve under the lighting power density standards, they could go to more efficient sources using better fixtures or better luminaires. He mentioned that lots of technologies allowed flexibility in illuminance relative to the amount of power required. He said that PG&E supported the Commission's proposals.

Mr. Doug Mahone of the Heschong Mahone Group at the September 4 hearing said the lighting zones were going to provide protection for the "average Joe." He gave an example of a gas

station and mini-mart that were built in his suburban town recently. He said its lighting was so bright that he had to shade his eyes to keep from being blinded and then he was unable to see in the rest of the neighborhood. He said it made the rest of the stores in the neighborhood look underlit even though that lighting was just fine before. Future businesses would be driven to the same light levels as the new gas station just to be seen; already, the trend in outdoor lighting of retail stores such as gas stations was toward excess brightness and glare. Mr. Mahone thought there was a consumer protection aspect to the lighting zone concept.

Mr. Mark Gastineau of Young Electric Sign Company at the September 4 hearing thanked the Commission for working very hard to come up with requirements for signs that can work for the industry (Section 148). He expressed concern with the proposed provisions of Section 149 (b) 1 J and wanted to make sure routine maintenance would not require rewiring of the sign. He said that after the discussion at the hearing that the concept of lighting zones made more sense to him than before. He said that the Energy Commission had come a long way in working through the issues of the sign industry, and that was good for California.

Mr. Robert Garcia of Golden State Advocacy at the September 4 hearing thanked the Energy Commission for addressing the concerns that the sign industry had raised with setting standards for signs (Section 148). He said that his client who makes one type of internally illuminated signs has no problem with the proposed Standards.

Mr. Jeff Aran of the California Sign Association (CSA) at the September 4 hearing said that he has nothing but praise for the Energy Commission's response to the sign industry. Most of the issues pertaining to signage had been resolved. He had a concern about the 45-day language related to Section 149 (b) 1 J, but he thought that language would get resolved. He did say that even though lighting zones did not apply to signs that the sign industry disagreed with the concept. Mr. Aran also sent a letter dated November 3 that reiterated CSA's opinions about lighting zones. The letter said that since SB 5X didn't mention using census data to help specify lighting zones that the Energy Commission should not do that. The letter also said that the Commission should have used terms from the IESNA/CIE guidelines such as "environmental zones," "intrinsically dark" or "high," etc., the latter including "town centers and commercial areas" for example to define the lighting zones. The letter said that because the Energy Commission didn't use these terms, it disregarded the ambient lighting concept. The letter said, "It's our understanding that even the League of California Cities is opposed to this process." The letter also expressed concern that the Energy Commission had posted a document on its website describing how the census zones could be determined. It said that this posting suggested the Commission endorsed the use of census zones prior to adoption of the Standards.

Ms. Yvonne Hunter of the League of California Cities sent a letter dated October 27 that supported proposed 15-day language in Section 10-114 (c) regarding the deletion of the limit proposed in 45-day language on the percentage of dry land area that could be subject to local government lighting zone designation. The letter said, "On behalf of the League, I wish to express our appreciation for this important change … As long as this language stays deleted, the League will have no objections to the proposed regulations …" The letter said the League would be happy to assist the Commission educate city officials about the Standards.

Mr. Jim Benya, the primary consultant to the Commission on the Outdoor Lighting Standards, at the September 4 hearing explained the relationship of the Commission's lighting zone designation to the IESNA/CIE concepts and guidelines. The problem with the designations in the IESNA/CIE guidelines is that they were not specific enough. The consulting team working for the Commission used the IESNA guidelines for lighting zones and the IESNA recommended practice documents for illumination levels by lighting zone and developed specific designations for lighting zones that could be used in Standards and lighting power densities for each lighting zone that made common sense and technical sense. Lighting zone 1 is essentially for national parks and

other intrinsically dark environments where people can see with very low light levels. Putting in very bright lighting systems would ruin the ability to both enjoy that and to provide the necessity of seeing. For Lighting zone 2 the rural definition fits it pretty well. The majority of the state by area is in this situation, and that's very intuitive. Lighting zone 3 is a default area for the city-type environment. The consulting team believed that communities would want the ability to say a particular portion of their city should have an especially high ambient light level, and they would define that as lighting zone 4. It's the place that will be allowed very bright light. Based on the IESNA recommendations, a lot of suburban areas that fall within the cities are presently over-lighted. This is an opportunity to help not only reduce energy consumption but prevent other problems, such as glare that may distract drivers, and avoid driving up light levels so that people can see when going from one area to another. The IESNA guideline for lighting zone 3 says that these will generally be urban residential areas. This is not specific. The actual definition for Lighting zone 3 is "areas of medium ambient brightness." Areas of high ambient brightness, according to the IESNA guidelines, are "normally urban areas having both residential and commercial use and experience high levels of nighttime activity." The consulting team believed that communities should decide where those areas occur, and allow power use there accordingly. It really boils down to communities being able to make that decision and individual projects and developers not being able to simply assume lighting zone 4.

The Energy Commission made multiple revisions to the proposed Standards to respond to these comments. The Commission revised Section 10-114 to eliminate constraints on local government designation of lighting zones, including deletion of the limitation of local changes of the statewide default designations to 20% of the dry land area and of the limitation of local changes to only one zone higher than the default designations. The Commission also clarified that local jurisdictions could raise the designations to higher zones for security reasons. The Commission made several changes to the lighting power allowances in Section 147 (c) to enable the illumination levels called for by the new IESNA security guidelines to be achieved. This included revision of the allowances for lighting zone 3 in Table 147-A, identification of allowances for specific security areas identified in the IESNA guidelines in Table 147-B, and creating a new table of allowances for special security requirements in Table 147-D (and the new Exception 2 to Section 147 (c) 1 B). The Commission also made several changes to address concerns with adequacy of lighting power allowances to meet IESNA guidelines and security needs for gas stations. This included establishing a new lighting application category for vehicle service station hardscape areas in Section 147 (c) 2 F and Table 147-B with allowances higher than other types of hardscapes (that are in Table 147-A), and increasing the lighting power allowances in Table 147-B for vehicle service station canopy areas. The Commission also added a note to Section 149 (b) 1 to further clarify that replacement of parts of an existing luminaire without replacing the whole luminaire is not an alteration subject to the Standards. The Commission also added a note to Section 149 (b) 1 J to further clarify that replacement of parts of an existing sign that do not require rewiring is not an alteration subject to the Standards.

With these changes the Energy Commission concluded that the Standards provisions for outdoor lighting power allowances and lighting zones are well founded and technically sound, and address legitimate needs for lighting illumination to carry out outdoor activities with safety and security while using efficient lighting equipment. The lighting zone designation approach is fully consistent with the IESNA/CIE guidelines with statewide default definitions that are specific and easily enforceable. By posting information on the Commission's website regarding US census information for determining rural and urban areas, the Commission demonstrated that this information is readily available, non-ambiguous, and easy to use. The lighting zone designation approach provides full discretion to local governments to improve upon the statewide default zones to better match the conditions and land-use planning goals at the local level. The Standards provisions are clearly needed to reduce wasteful, uneconomic, inefficient and unnecessary consumption of electricity and are well within the authority of the Commission established by statute.

No party that had raised concerns with the proposed 45-day language provisions for outdoor lighting power allowances and lighting zones expressed opposition to the revised Standards at the November 5 adoption hearing. At that hearing, Mr. Gutell thanked the Commission for its openness and receptiveness regarding industry comments on outdoor lighting for gas station canopies and hardscape. He said, "We were able to make our case, and I believe we reached a very fair agreement." He urged the Commission to accept the Standards as written. Also, at the adoption hearing Mr. Arita expressed appreciation for the Commission's effort and willingness to work with the industry and supported adoption of the Standards.

Residential Lighting

Ms. Cheryl English of Acuity Brands Lighting Group in a letter dated August 29 recommended changing the proposed 45-day language requirement in Section 150 (k) 1 for electronic ballasts for lamps that are 18 watt or greater to apply to lamps that are 13 watts or greater. This would insure that lighting installed to comply with the Standards would not flicker when turned on and be a nuisance to the resident. At the September 4 hearing she said that the electronic ballast requirement would be equally cost effective for 13-watt lamps as for 18-watt lamps. Mr. Noah Horowitz of NRDC and Mr. Jim Parks of the Sacramento Municipal Utility District supported the change. Mr. Hodgson of CBIA, at the September 4 hearing and in a letter dated September 3, asked for information on the cost and availability of 13-watt fixtures with electronic ballasts. Ms. English subsequently worked with CBIA to provide that information. The Energy Commission changed the requirement for electronic ballasts in residential lighting fixtures from 18 watts down to 13 watts as recommended.

Mr. Edward Gray of NEMA in a letter dated August 28 expressed concern that the proposed 45-day language in Section 150 (k) 1 would disallow high pressure sodium or metal halide (i.e., high intensity discharge sources) that might be used on the exterior of a house from being considered as a high efficacy source even though it would have a higher efficacy than the requirements shown in Table 150-C. Mr. Gray also said that low-voltage MR 16 lamps should also be considered high efficacy. He said when dimmed they can be efficient for delivering light where it is needed. The Energy Commission agreed with Mr. Gray's comment about high intensity discharge sources and added the Exception to 150 (k) 1 to allow high intensity discharge luminaires with hardwired electromagnetic ballasts and medium screw base sockets to be considered high efficacy for outdoor applications. The Commission did not agree that MR 16 lamps should be considered high efficacy, but the Standards would allow their use as accent lighting in kitchens and in conjunction with allowed controls, including dimmers as indicated by the Standards, in other rooms.

Daylighting with Skylights

Mr. Jon McHugh of Heschong Mahone Group on behalf of Pacific Gas and Electric Company submitted revised excerpts of the technical report *Revisions to Proposed Updates to Title 24 Treatment of Skylights*. The report provided specific justification for the following changes to the 45-day language in Section 143 (c): more specific definitions of multi-level astronomical time clocks; reintroduction of the option to determine minimum skylight area requirements based on "effective aperture"; and introduction of an intermediate lighting power density criteria with less restrictive minimum skylight requirements. The Energy Commission agreed with the proposed changes in this report and incorporated those in the Standards.

Comments Not Resulting in 15-Day Language Revisions

General

Mr. Norman Sorensen of the state Housing and Community Development agency (HCD) sent the Energy Commission a letter dated September 23, 2003. He listed a number of topics that concerned him; however, he made the same point about many of them. Mr. Sorensen's understanding of the Commission's cost effectiveness analysis for the proposed Standards was that the analysis did not take into account the monetary implications of financing (through a 30-year mortgage) the added costs of the proposed residential energy efficiency changes. He relayed this concern about proposed changes to the following sections in the Standards:

- Section 150(j) - Water Piping and Cooling System Line Insulation Thickness and Conductivity
- Section 150(k) - Residential Lighting – Permanently Installed Luminaires
- Section 150(k)5 - Airtight Recessed Lights
- Section 151(f)3 - Fenestration Glazing Area
- Section 151(f)7 - Space Heating and Space Cooling – Federal Standards Increase in Minimum SEER
- Section 151(f)8 - Water-Heating Systems - Federal Standards Increase in Minimum Efficiency
- Section 151(f)10 - Space Conditioning Ducts
- Section 152(a)1 and related sections in 151(f) - Prescriptive Approach, Additions, Fenestration Requirements
- Sections 152(b)1A, 152(b)1B and related sections in 151(f) - Prescriptive Approach, Alterations, Window Replacement

Mr. Sorensen provided an example of how he thought financing should be considered, but his understanding of the cost effectiveness analysis was incorrect. The Commission uses the life cycle cost approach as required by PRC 25402. Future costs (e.g., energy costs) are considered when they occur and then discounted back to account for the future value of money to result in a present value. Mr. Sorensen's example left out the concept of discounting future costs to arrive at a present value. The Energy Commission uses a real discount rate (net of inflation) of 3%. Current inflation rates are running right at 3%, so the nominal discount rate is 6% (3% + 3%). If a 6% discount rate is applied in combination with the 6% mortgage interest rate that Mr. Sorensen used in his example, the present value of the amortized costs would be the same as the initial cost.

Typically, the Energy Commission uses the initial costs of measures in its cost effectiveness analyses rather than using a stream of costs assuming that the measures are financed through the mortgage. This results in a conservative analysis. If the analysis was to consider financing, the principal and interest would need to be determined for each time period and then those costs would need to be discounted back to obtain a present value. The interest rate would be approximately the same as the nominal discount rate so the added interest would be cancelled out by the discounting, returning the present value to an amount similar to the initial cost without financing. However, there are other considerations in this type of an analysis, including tax effects and the impact on property values at resale. The combination of federal taxes and state taxes on mortgage interest deductions results in a tax reduction of about 1/3 of the mortgage interest. An analysis after tax effects would show that by financing the cost of an investment in a home's energy efficiency, the present value of the stream of costs is actually less than the initial cost by the amount of the tax savings.

Also, a theoretically complete analysis of the measure cost effectiveness would include its impact on the value of the property. Investment in energy efficiency measures have been shown to result in very good improvements in property value. Fannie Mae and Freddie Mac have provided guidance to appraisers that energy efficiency measures should be valued at the present value of the energy savings from the measure. For measures where the present value of the energy savings is greater than the initial cost of the measure, the value of the property goes up by more than the initial cost of the measure. So, the homeowner makes a profit by investing in the measure as well as being paid back for the measure by the energy savings.

Since the Energy Commission does not include tax effects and effects on the property value of the home, but merely compares the present value of the energy savings to the initial cost of the measures, the Commission's conclusions on cost effectiveness are conservative (in some cases extremely conservative).

Ms. Misti Bruceri representing Pacific Gas and Electric Company also responded Mr. Sorensen's comments on cost effectiveness in her October 29 letter. She pointed out that the Energy Commission's life cycle cost methodology explicitly includes the time value of money. She also provided an example of how a cash flow analysis would show that savings on the monthly energy bill would be substantially greater than the costs each month of a measure (she used an example of efficient lighting) if paid off through the mortgage. In her example the homeowner would do slightly better than break even the first year in paying back the down payment and would accumulate substantially more energy savings than mortgage bill increases in the remaining years of the mortgage. Ms. Bruceri's example left out additional tax and property value benefits to the homeowner.

Mr. Sorensen also expressed concern about the total cost increases resulting from the proposed changes that impact the affordability of housing. Therefore, he recommended that the Energy Commission conduct further study to find viable means to reduce the total financial impact on the overall cost to housing while achieving their stated objectives in reducing overall energy demands. The Energy Commission through extensive investigation of each measure determined that the costs due to the Standards would be modest in comparison to the energy bill savings, thereby improving the affordability of housing. A substantial portion of the savings of the new Standards in residential buildings is due to incorporation into the Standards of higher efficiencies for air conditioners and water heaters due to recently adopted federal appliance standards. Federal law requires that state energy codes incorporate these standards. Estimates of the cost of these new federal standards were determined by the U.S. Department of Energy in a thorough rulemaking proceeding. Those cost estimates are dramatically less than the estimates that Mr. Sorensen made in his comments.

On another general matter, at the September 4 Committee hearing, Mr. David Ware of Owens Corning said he believed that the definition section [Section 101(b)] would be less cumbersome if the many referenced standards defined there were listed just in Appendix 1-A. The Energy Commission, however, believes that the definition section provides the correct, non-ambiguous way to define referenced standards, actually streamlines the standards, and makes them easier to update in the future.

Also at the September 4 hearing, Mr. Stephen Yurek of ARI recommended, rather than putting a year on each of the referenced standards from other organizations, that the Energy Commission remove the year reference, because referenced standards are updated on a regular basis that don't necessarily coincide with updates of the Energy Efficiency Standards. The Energy Commission disagrees citing that the dates of reference standards are needed for regulatory certainty.

Mandatory Insulation Requirements

In his letter dated October 3, Mr. Greeley representing DOW Chemical of Canada suggested adding foil-faced bubble pack insulation materials to Table 118-A. The Energy Commission did not make this change because this insulation product is a subset of the foil insulation types already listed in the table.

Fenestration Requirements for Additions

Mr. Sorensen of HCD, in his September 23 letter, expressed concern over Section 152 (a) 1 regarding window requirements for additions. His thought was that a dwelling unit owner would have to install a window that would not correspond to the existing windows in the structure. He thought that this would not be esthetically pleasing to look at and that many CC&Rs would not allow a dwelling unit's exterior scheme to be modified without modifying the entire existing exterior windows to be uniform. Under this scenario he envisioned that the homeowner needing to replace one window would be forced to change out all existing windows in order to maintain a complete exterior scheme. Mr. Sorensen estimated that this would add an additional $7,000 to $12,000 to the cost of a small addition to an existing dwelling unit, which would be substantially more than the energy savings resulting from the change. Ms. Bruceri of PG&E responded to these comments in her letter of October 29, 2003. She points out that the Standards do not cause the consequences that Mr. Sorensen thinks they do. The Standards for the past ten years have required a U-factor equivalent to double glazing for additions, and that is not changed by the 2005 Standards. Requiring a switch from single to double glazing in additions has not emerged as a problem in that time period. Consumers are choosing double glazed windows almost universally over single glazed. The performance approach is always available when trading off any prescriptive requirement is desired. The Energy Commission agrees with Ms. Bruceri's comments. The changes for additions do not cause the problems that Mr. Sorensen suggested, and even in a case where CC&Rs would block a homeowner from installing the cost effective windows required for prescriptive compliance, the performance approach would allow compliance for a far lower cost than Mr. Sorensen stated.

Fenestration Requirements for Alterations

Mr. Sorensen's letter also expressed concern with the prescriptive requirements for alterations to fenestration in Section 152(b) 1 B. Mr. Sorensen thinks that the cost associated with the requirement would be $50 per window, which he believes would be excessive. He also repeated the concern that he expressed related to additions that the requirements may cause replacements that are not esthetically pleasing or that CC&Rs could cause all of the windows in a house to have to be replaced. Mr. Sorensen also expressed concern that to avoid the requirements, a dwelling unit owner might choose not to replace any windows when necessary thereby allowing the dwelling unit to deteriorate and eventually become sub-standard; or the owner might choose to ignore the building standard and replace a window with materials in kind. He was also concerned that the requirements would not be enforced because few enforcement agencies require building permits to replace a window in a dwelling.

Mr. Eric DeVito of Cardinal Glass Industries disagreed with Mr. Sorensen in a letter dated October 8, 2003. Mr. DeVito pointed out that the $50 per window upgrade estimate by Mr. Sorensen is not accurate. The requirement in the Standards can be met by installing low-E glazing in virtually any double-pane window frame rather than requiring a change in the window frame type that Mr. Sorensen thought would be necessary. The cost to meet the requirement would be only $15 per window. Mr. DeVito pointed out that this would be money well spent. Mr DeVito also disagreed with Mr. Sorensen's scenario that assumed that the homeowner would have to replace all the windows in an existing home. Mr. DeVito pointed out that if homeowners actually were forced by CC&Rs to maintain an exact match of the existing windows, they would

be end up replacing only the glass portion of the window. This replacement would be considered a repair under the Standards; repairs are excepted from the Standards requirement. Mr. DeVito stated that the new requirements would have a major beneficial impact on the window industry of streamlined inventories and economies of scale because the low-E product line would become the stocked item.

Ms. Bruceri of PG&E also disagreed with Mr. Sorensen in her October 29 letter. She pointed out that the added cost of this requirement is a small portion of the cost of replacing a window. She said that the common replacement technique is to replace all windows in a home so the issue of matching existing windows is not applicable in those cases. But she also pointed out that the Standards do not require the homeowner to upgrade all windows. Lastly, she pointed out that the performance approach is available in cases where trading off the prescriptive requirements is desired.

The Energy Commission agreed with the comments of Mr. DeVito and Ms. Bruceri. The requirements are very much in the homeowner's interest and will result in a more affordable house. The cost of the requirement is small compared to the energy savings and very small relative to the total cost of the replacement window. The Standards in no way require all windows in the home to be replaced. There is no particular reason why homeowners would go out of their way to avoid the window replacements required by the Standards. Section 100 (a) 2 requires the Standards to be enforced by the local building department when the local building department requires a building permit. In those cases the building department will be providing a service to the homeowner in assuring that the benefits of windows that meet the Standards requirements (lower energy bills, increased comfort, sound attenuation, increased property value) will be achieved. In those jurisdictions that do not require building permits for replacement windows, the Standards requirement has the advantages that Mr. DeVito stated of providing clear messages to the window industry related to stocking and lowering the cost of energy efficient windows and establishing a standard of care for contractors installing replacement windows.

Glazing Area

Mr. Sorensen of HCD commented on the new glazing area allowances in Section 151 (f) 3. He thought that the glazing area allowances that are higher than the current Standards in some climate zones would increase the cost of fenestration and would have a negative impact on the affordability of housing. He also commented that the revisions to the U-factor requirements in the prescriptive Standards would increase the cost of a window by $50.

These comments are not accurate. The increases in the glazing area allowances result in the Standards being less stringent rather than more stringent. With previous Standards if builders could not meet the lower glazing area allowances, they would be precluded from using the prescriptive approach; they would only have the option of meeting the performance approach. The energy budget in the performance approach would be based on the glazing area specified in the prescriptive packages. To accomplish the builder's desired glazing area, other energy efficiency measures would have to be installed in the building to compensate, which would result in higher costs. Under the updated Standards the higher glazing area allowances will result in more homes being able to use the prescriptive approach. Also, since the performance standards use the prescriptive glazing area allowances to set the energy budget, the higher allowances relax the energy budget somewhat. The result of the increased glazing area allowances will be to lower costs rather than increase costs.

The U-factor requirements were changed to recalibrate them given recent changes in the test procedures used for determining U-factors for windows. The new U-factors were determined so they would result in allowing the same windows as the old U-factors would cause to be used. There is no increase in stringency or cost due to the U-factor changes.

Air Retarding Wraps

Mr. Greeley of Dow Chemical in his October 3 letter suggested a change to the Residential ACM Manual, Section 3.5. He suggested reducing the requirement for air retarding wraps from a minimum perm rating of 10 to a minimum perm rating of 5.0. The 10 perm rating has been a criterion for compliance credit for air retarding wraps since 1999, at which time Mr. Greeley had raised the same concern and the Commission had thoroughly reviewed the matter. The Commission had not proposed to change the criteria in this round of Standards, and Mr. Greeley did not provide any new evidence that a change would be appropriate. Mr. Greeley made this suggestion at the last minute so there was not time to obtain comment from other parts of the industry who had previously participated in discussions of the issue but were not aware that it was being raised again by Mr. Greeley.

Duct Insulation

Comments were received on the prescriptive duct insulation requirements in Section 151 (f) 10 at the September 4 hearing from Mr. Keith Thomas of CASCO, Mr. David Ware of Owens Corning, and Mr. Mike Hodgson of CBIA (also in September 3 letter), Mr. Michael Day of Rockwood Consulting, Mr. Sorensen in his October 29 letter, and Mr. John Lamborn of JP Lamborn Company in his September 3, 2003 email. The Standards would leave the current statewide requirement of R-4.2 in effect for the three mildest climates where the Commission found no change to be cost effective, and increase to R-8 for the mountains and desert climates and to R-6 for the other climate zones. Mr. Thomas, Mr. Ware and Mr. Lamborn supported the R-8 requirement in the extreme climates, but suggested changing the requirement for the mildest climates to R-6 so that manufacturers could stop stocking R-4.2 resulting in lower costs for inventories and simpler overall standards. Mr. Day pointed out that the Commission is approving a new compliance option for ducts buried in attic insulation that will create a low-cost means for R-4.2 insulated ducts in some parts of the duct system to be buried and achieve the equivalent energy savings of a system that uses R-6 ducts exclusively. He pointed out that making the requirement R-6 in all but the extreme climates would make the buried duct option less attractive. Mr. Hodgson’s letter had questioned the cost effectiveness of the requirement. At the hearing he supported levels that were cost effective rather than make the levels the same for other reasons, and said that he had a minor disagreement about the Commission's costs.

Mr. Sorensen said the he believed that the requirements were a major change with major impact on overall costs. Mr. Thomas asked at the hearing why the cost for R-8 was so different in the cost effectiveness report between the Oregon contractors and the California contractors. Mr. Bruce Wilcox, the Energy Commission's consultant, explained at the hearing that Oregon has had a building code requirement for R-8 for many years and reported very low to insignificant cost increases for R-8 whereas in California using R-8 is rare and the contractors reported high costs. The Oregon cost estimates, which are much lower than what was used in the Commission's cost effectiveness analysis, are likely to be more representative of the actual costs in a mature market after the requirement is in effect for a period. Mr. Wilcox also pointed out that one California contractor who routinely installs R-8 duct insulation reported no significant cost for upgrading to R-8.

Mr. Ware pointed out that there is already a national precedence for at least R-6, if not R-8, and other states such as Oregon, Washington, Florida, and New York have a high R-value compared to California. This is consistent with one of the "Documents Relied Upon," a letter from Mr. Lamborn dated November 14, 2001, which said that R-4.2 accounts for 94% of his national company's shipments to California while R-6 and R-8 now account for almost 40% of the industry's national sales. Mr. Lamborn stated in the letter that R-6 and R-8 volume is continuing to increase in most areas of the country and the price of these products has dropped significantly.

After careful consideration of all of the comments, the Energy Commission decided that adoption of the proposed Standards requirements was well justified. The Commission believes that the cost estimates and the cost effectiveness conclusions are reasonable, and that it is likely that actual costs will be lower once the Standards requirement is in place in the California market. It should be noted that the 2003 Uniform Mechanical Code requires a minimum of R-6 duct insulation in many California climates. Once those values are adopted into the California Mechanical Code, they would be adopted by reference as minimum requirements in Section 150(m) of the Standards.

Duct Sealing Requirements for Alterations

Mr. Sorensen of HCD included comments on Section 152(b)1D, which requires duct sealing when space conditioning systems are being replaced in homes, in his September 23 letter to the Commission. Mr. Sorensen included estimates of costs that he got from one local contractor that were dramatically higher than the Energy Commission's $660 cost for this requirement. Mr. Sorensen said that the cost of repairing and sealing the ducts might be as much or more than the cost of a new space conditioning unit. He said that may cause some existing homeowners to violate local permit requirements by installing space conditioning equipment without permits.

Ms. Bruceri of PG&E pointed out that the Energy Commission's costs for the requirement were obtained from a large sample of price quotes and not from a single source. She also pointed out that the requirement applies only in climate zones where the energy savings was at least twice as much as the cost.

The Energy Commission did not agree with Mr. Sorensen's comments. As Ms. Bruceri stated, the Energy Commission's cost came from an analysis of data for a large number of homes participating in duct sealing programs operated by all of the state's utilities. If anything this estimate was likely to be high compared to the Standards requirement. The Standards requirement would result in duct sealing being done routinely when contractors were out to the home to install a replacement air conditioner or furnace. This would save time, travel and transaction costs compared to the costs that were experienced in the utility programs because in the utility programs the contractors were making a special effort to get the ducts sealed rather than doing it in conjunction with the installation when they would already be on the site and working on the unit. A possible source of confusion on Mr. Sorensen's estimate was that the local utility (Sacramento Municipal Utility District) runs a program that includes more than just duct sealing. In SMUD's program the ducts are not only sealed but they are tested to see if they are producing their design airflow to all rooms and; if not, the participating contractor recommends in some cases substantial reconstruction of the duct system to achieve the design airflows. The average cost for all of this extra work in SMUD's program in addition to duct sealing is about $1100 (a value that is too high to apply just to duct sealing but is far less than Mr. Sorensen's estimate). It is quite clear that the energy savings from duct sealing is very cost effective. Ducts have been shown by field research to commonly leak excessively. This is a major problem that drives up home energy bills and makes homes uncomfortable and potentially unsafe. It makes no sense for new, higher efficiency air conditioners and furnaces to be connected to leaky duct systems and squander the energy that they were supposed to be saving. The ideal time to take care of the problem is at the time when the replacement unit is installed. It is unlikely that the requirement would have an impact on whether or not permits are taken out. Contractors who comply with the requirement would substantially increase the value of their service and deliver energy savings substantially in excess of the added cost. They also would be avoiding callbacks from dissatisfied customers who would not have received the energy savings they were expecting if the replacement units had been connected to leaky ducts.

Space Conditioning Fan Motors

Mr. Yurek representing ARI commented in his letter of November 3 regarding concerns with Section 144(c)4, which requires fan motors for series fan-powered terminal units in space conditioning systems to be either electronically commutated or to meet a minimum efficiency. He thought that this mandated the use of a particular motor technology (electronically-commutated motors) and that there was only one major manufacturer of such motors in the U.S. He also expressed concern that this section targeted one type of air distribution system only (i.e., series terminals) and might encourage designers to switch to other types of systems that are less efficient (e.g., parallel boxes). The Energy Commission disagreed. There is more than one manufacturer of electronically commutated motors, and the alternative minimum efficiency requirement allows the use of other technologies to achieve efficient fan motors. The requirement will not drive designers to use less efficient equipment. The example that Mr. Yurek identified, parallel boxes, actually uses less energy since the the fans run only during heating.

Space Conditioning System Efficiency

Mr. Yurek (representing ARI, the Gas Appliance Manufacturers Association, Association of Home Appliance Manufacturers, and National Electrical Manufacturers Association) expressed concern at the September 4, 2003 hearing and in a letter dated September 29, 2003 with requirements in current Standards Sections 110 (b) and 111 that appliances for which there is a standard in the appliance efficiency regulations may be installed only if the manufacturer has certified to the Energy Commission that the appliance meets that standard. Mr. Yurek stated his opinion that federal law pre-empts California from having requirements in its Building Energy Efficiency Standards, which require certification and filing of information regarding the efficiency of the appliance. He also stated his opinion that such requirements were disallowed by the permanent injunction issued by the U.S. District Court against the Commission requiring certification and filing of information through its appliance regulations. Mr. Yurek repeated these comments at the November 5, 2003 hearing.

At the November 5 hearing, counsel for the Commission explained that the provisions that Mr. Yurek commented on are existing provisions in the Building Standards, and that they have been in the Standards for at least 20 years. They are unchanged from their existing wording and are not within the scope of the rulemaking to update the Standards. Moreover, the issue that Mr. Yurek is raising is related to an ongoing case in the courts, and there is no closure on the case at this time. If the courts ultimately agree with the viewpoint expressed by Mr. Yurek, the Commission would be advised to consider appropriate changes to the Standards at that time. But that has not occurred yet and is certainly not part of this rulemaking.

Pipe Insulation in Space Conditioning Equipment

Mr. Stephen Yurek of ARI submitted comments in a letter dated November 3, 2003, concerning Exception 1 to Section 123, which exempts piping in space conditioning equipment certified under Section 111 or 112 from the pipe insulation requirements. Mr. Yurek recommended that this exception be extended to piping in space conditioning equipment not certified under those sections. He recommended amending the exception to refer to equipment certified by a nationally recognized certification program. The Energy Commission decided not to make this change. The exception as written has been in the Standards for more than a decade without any previous voicing of a problem with it. It was not proposed for change in this rulemaking so no notice was made to other parties that it could be subject to change. The recommended language by Mr. Yurek is too vague to be acceptable for regulations. Part of the piping that Mr. Yurek is concerned about would be considered runouts subject to lower insulation levels in Table 123-A.

Demand Control Ventilation

Mr. Len Damiano of EBTRON, Inc. in a letter dated October 14 expressed concerns with the proposed standards provisions related to demand control ventilation in Section 121 (c). Mr. Mark Hydeman, the consultant who developed the changes to the Standards related to demand control ventilation responded to Mr. Damiano's letter in an email dated October 21. Mr. Hydeman's response made Mr. Damiano aware of the technical report that had been written to justify the Standards provisions, and provided information about other aspects of the Building Energy Efficiency Standards that address Mr. Damiano's comments. Mr. Hydeman also met personally with Mr. Damiano to review the intent and basis of the Standards provisions for demand control ventilation. Mr. Damiano appreciated this discussion and explanation and did not feel the need to further participate in the proceeding. The Energy Commission did not believe changes to the proposed 45-day language were warranted.

Cool Roofs

Mr. Lee Shoemaker representing the Cool Metal Roof Coalition expressed concerns at the September 4 hearing and in a September 4 letter with the cool roof requirements (Section 118, 143 (a) 1A, and 141 (a) 1 B) . He thought that metal roofing would not be able to comply with the prescriptive requirements in Section 143 (a) 1 A. He also didn't understand how the performance standards worked and thought they would require roofing to meet the prescriptive requirements, which would mean that metal roofing couldn't comply with them either. As a result he thought that the metal roofing industry would be seriously harmed. He also was unclear as to whether the cool roof requirements applied to unconditioned buildings. He expressed concern that the Standards have the same prescriptive cool roof requirement in all climate zones and believed that the Standards should use the same reflectance requirements as the *Energy Star* program.

At the September 4 hearing, the Energy Commission clarified how the performance standards work - that the prescriptive standards requirements are used to set an energy budget for the building (the Space Conditioning Budget described in Section 141 (a) 1, and the actual building could use other energy features as long as the energy budget is not exceeded. Buildings with metal roofing definitely could comply with the performance approach without having to meet the cool roof requirements of the prescriptive approach as long as they were more energy efficient in other components of the building. The Commission also pointed out that the Overall Envelope Approach (Section 143 (b) 2 and Equation 143-E) provides a prescriptive compliance path for buildings with metal roofing. The Commission also clarified that the cool roof requirements do not apply to unconditioned buildings (Section 100 (e) 2 C and Table 100-A). Regarding Mr. Shoemaker's concern about the cool roof requirements being the same in all climate zones, the Commission explained that was the case because the cost effectiveness analysis determined cool roofs to be cost effective in all climate zones. However, it was pointed out that in the performance approach the cool roof would be a more powerful energy saver in the hot climates, and it would be easier to comply without a cool roof in the milder climates. Mr. Mike Gabel representing CABEC said that compliance can be fairly easily shown for metallic roof buildings through either the performance approach or the prescriptive envelope tradeoff approach.

Mr. Shoemaker also expressed concern regarding what he thought was a new requirement in Section 10-113 that independent testing and labeling of roof reflectance and emittance be certified to the Cool Roof Rating Council (CRRC) rather than allowing manufacturers to get the testing done in their own test labs and to self-certify. He did not understand that the requirements for testing and labeling certification through the CRRC are in the current Standards. The Commission believes it is very important that credible testing and labeling be assured through the CRRC in a similar manner to how testing and labeling of fenestration products is required by the National Fenestration Rating Council.

Mr. Matt Kolb of National Coatings Corporation sent an email dated November 3, 2003, regarding Section 118(i), specifically Exception 2 to Section 118(i)3. He recommended returning to the 2001 Standards requirements [Section 118(f)3 then] for acrylic roof coatings to meet ASTM D6083. The Commission changed this requirement in the 2005 Standards by creating Table 118-C to be more specific and to provide comparable requirements for most prominent roofing material types (D6083 covers only elastomeric coatings). The Energy Commission disagreed with Mr. Kolb's recommendation to return to just the D6083 test procedure.

Quality Insulation Installation

Mr. Charles Cottrell of the North American Insulation Manufacturers Association (NAIMA, a trade association of fiberglass insulation manufacturers) expressed concern at the November 5 adoption hearing and in a letter dated October 17 about Section RH 4.3.6 of Appendix RH of the Residential ACM Manual, which contains the provisions for checking the installation of loose-fill wall insulation to qualify for extra compliance credit for doing a high quality installation job. The labor unions, Glass, Molders, Pottery, Plastics, and Allied Workers and the West Coast Protective League, which represent fiberglass insulation manufacturing workers, sent virtually identical letters dated November 3, 2003. They referred to a Federal Trade Commission notice that recommended that manufacturers disclose information, such as drying times, if that information is important to proper installation of the materials. They also referred to a technical bulletin published by the Cellulose Insulation Manufacturers Association that states that normal drying times for sprayed wall insulation was 24 to 48 hours and that calls for manufacturer's recommended drying times be followed by installers. Based on this information, Mr. Cottrell and the unions recommended that the Commission add a requirement that walls not be enclosed until a minimum of 48 hours after installation of loose-fill wall insulation. Mr. Cottrell also referred to a Canadian study that found problems with moisture in wet sprayed cellulose in walls.

Mr. Ivan Smith representing the Cellulose Insulation Manufacturers Association (CIMA) submitted a letter dated November 3 that opposed the NAIMA proposal. He pointed out that the FTC recommendation was related to moisture and settling in attic insulation, not wall insulation. He said that since CIMA published application guidelines in 1998, they are unaware of any situations of moisture problems with wet-spray wall insulation. He said that the changes proposed by NAIMA appear to be an attempt to create problems with scheduling drywall attachment when loose-fill insulation is installed with water, which could favor fiberglass insulation. He said that CIMA is against this "11th hour" proposal by NAIMA.

At the November 5 adoption hearing, Mr. Bruce Wilcox, one of the Energy Commission consultants who worked on the insulation quality installation procedures, pointed out that NAIMA's proposal was discussed by the industry review committee that helped develop the procedures and was not accepted. He said there was no significant impact from the moisture on the energy performance of the insulation systems, that no one presented any evidence of moisture problems in California housing caused by moisture in the insulation, and that the insulation quality installation procedures already required installers to follow manufacturer's installation instructions. Mr. Rick Chitwood, the other Energy Commission consultant working on the insulation quality installation procedures, said at the November 5 hearing that he was familiar with the study. He said it obviously was a stretch to apply a Canadian study to California weather conditions. He also pointed out that the houses tested in the study were constructed to Canada's R-2000 energy efficiency standards, which result in homes that are substantially tighter for air infiltration than California houses, so drying times would be slower on the Canada houses. He said that the study concluded that wet cellulose insulation nearly saturated wood framing, but within six months the framing dried almost to the level before installation, even during a Canadian winter.

The Energy Commission agreed with the comments of Messrs. Wilcox, Chitwood, and Smith and made no change to the proposed standards.

Mr. Ware of Owens Corning at the September 4 hearing and in his letter dated September 7 expressed concern with the provisions of Section RH 5.2.1 of Appendix RH of the Residential ACM Manual, which provides verification procedures for ceilings insulated with loose-fill insulation. He suggested that third-party verifiers confirm that the installer used the manufacturer's recommended number of bags and bag weight to achieve the correct installed R-value for the given ceiling square-foot area, or that the verifiers use Technical Bulletin #17 from the Insulation Contractor's Association of America (ICAA). In a letter dated September 8, 2003, Mr. Charles Cottrell of NAIMA also expressed support for having third-party inspectors verify that the appropriate numbers of bags of insulation were installed at the minimum specified depth to achieve the minimum desired R-value. He said that the requirements to do density measurements (as required by the ICAA Technical Bulletin) would not be viable for mineral fiber insulation.

The Energy Commission did not accept Messrs. Ware's and Cottrell's recommendations of counting empty insulation bags as a satisfactory means to verify loose-fill insulation density. Empty bags left at the job site are not sufficient evidence that the proper amount of insulation was installed. Empty bags from insulation installed at a different job site could be left. Also, insulation blowing machines hold several bags of insulation so insulation from several empty bags could remain in the blowing machine at the end of the job. Since the density for mineral fiber insulation can vary widely and measurement of the depth alone is not sufficient to insure quality installation, it is necessary to verify density for mineral fiber insulation. The Energy Commission agreed with Mr. Ware's suggestion for referencing the ICAA Technical Bulletin for measuring density of mineral fiber insulation. Commission consultants had demonstrated in previous field tests that this procedure is not difficult for mineral fiber insulation and can be done very practically in very little time. On the other hand the density of loose-fill cellulose insulation does not vary substantially, and measurement (accounting for settling according to the insulation quality installation procedures) of the depth alone is sufficient to insure quality installation. Measurement of the density of cellulose insulation can be difficult and unacceptably time-consuming. The Energy Commission concluded that it is not necessary or appropriate to require density to be measured for loose-fill cellulose insulation according to the ICAA Technical Bulletin. At the November 5 adoption hearing Mr. Ware and Mr. Cottrell did not re-raise these concerns. Mr. Ware said that Owens Corning supported the Standards. Mr. Cottrell thanked the Commission for addressing many of NAIMA's concerns and including them in the process of developing the Standards.

Daylighting with Skylights

Mr. Jerry Blomberg representing Sunoptics Prismatic Skylights at the September 4 hearing and in a letter dated August 27 recommended that the Energy Commission change Section 143 (c) to require smaller buildings (change the proposed minimum size of buildings requiring skylighting from the proposed 25,000 square foot to 10,000) and buildings with lower ceiling heights (change the proposed minimum ceiling heights from 15 feet to 12 feet) to require far more buildings to have skylights. He said that skylights would be cost effective down to the levels he recommended. Mr. Jon McHugh of the Heschong Mahone Group, the consultant who did the analysis of the skylights proposal, responded. He said that the proposal in the 45-day language is actually quite revolutionary in terms of energy standards. Every other energy standard in the country endeavors to minimize the heat gain and heat loss of skylights-while the proposed standards recognize skylights as an energy saving feature of the building. The code change proposal really changes the way that people think about designing buildings. The cost effectiveness analysis used conservative costs and was structured to be very cost effective and to minimize potential implementation problems. If the goal is to make an incremental change to

change the basic design of buildings, it is the right way to go. It is addressing the building types where skylighting is most cost effective.

Mr. Blomberg also raised a concern with the minimum connected lighting load specified in Section 143 (c) below which skylights did not have to be installed. He said that is a problem for shell buildings where the permit is taken out to build the outside shell before the tenant is known and there is no lighting design. At the time of this permit, the requirement for skylights would not apply. However, it is most cost effective to install skylights before the roof is put on rather than to cut holes in the roof afterwards. He recommended eliminating the minimum connected lighting load in the proposed 45-day language. Mr. McHugh also responded to this point. The problem with requiring skylights at the time the shell building is built is that it is not clear what the tenant improvement is going to be. The building actually might be broken up into small spaces with dropped ceilings that are well below the 15 foot height that triggers skylights in the proposed standards. With the Standards as they are proposed, the tenant improvement will determine whether the criteria that trigger skylights has been met or not. To avoid the cost of installing skylights after the roof is on will require that the builder think about who their target market is and construct the building accordingly.

The Energy Commission concluded that it was not appropriate to change the proposed 45-day language. The smaller area and ceiling height thresholds proposed by Mr. Blomberg were outside the scope of the cost effectiveness analysis that was done for the Standards. Substantial additional analysis beyond the current resources of the Commission would have to be done to consider Mr. Blomberg's proposal, and other impacted stakeholders would be surprised by such a large change. The Commission agrees with Mr. McHugh that the current proposal is properly scoped to incrementally change how nonresidential buildings are designed. Regarding Mr. Blomberg's proposal for shell buildings, it would not be possible to know whether skylights will be a cost effective measure until after the connected lighting is known and whether the area and ceiling height criteria in the Standards are met. At the time of tenant improvements, skylights can be added or the building can comply with other measures through the performance approach.

Outdoor Lighting Controls

Mr. Harold Jepsen of the Watt Stopper at the September 4 hearing asked why the Energy Commission did not propose acceptance requirements for outdoor lighting (Section 132) similar to those for indoor lighting. The Energy Commission did not establish acceptance requirements for outdoor lighting controls because that was outside the scope of the Commission's investigation of acceptance requirements that was conducted for this Standards update proceeding. The Commission currently does not have baseline information or an economic analysis to support acceptance requirements for outdoor lighting controls.

Nonresidential Indoor Lighting

Mr. Pat Splitt of AppTech, at the September 4 hearing, expressed concern with the limitation in Section 146 (b) 3 that would provide tailored lighting allowances only for spaces whose combined area would be over 30% of the building. He thought that would not enable ornamental or special effects lighting to be installed in tenant improvements where the space was below that threshold. He recommended creating a special allotment for that situation. The Energy Commission believes that there is adequate room in the lighting power allotments to meet the situation Mr. Splitt identified. The Commission went through some examples with Mr. Splitt to confirm that his concerns were not warranted. Mr. Splitt did not re-raise the concern after that.

Residential Lighting

Mr. Sorensen of HCD in a letter to the Energy Commission dated September 23 expressed concern with the proposed residential lighting Standards in Section 150 (k). He said that a cost analysis conducted by the California Building Industry Association for this proposed section revealed that cost for compliance would be approximately $400 per dwelling unit. This figure represented the initial costs for material only. He thought that the requirement would not be cost effective and could impact the affordability of housing. He also expressed concern about the proposed requirement for airtight [ICAT] recessed lighting in Section 150 (k) 5. He thought that the provision would require the light fixture housing to be permanently sealed to the ceiling. He believed that the requirement would make it impossible for enforcement officials to fully inspect and determine compliance without requiring the installer to remove the sealing material from around the fixture housing or coordinate inspection with the installation of the light fixtures. This would unnecessarily add to the cost of housing.

Ms. Misti Bruceri of PG&E responded to Mr. Sorensen's comments in a letter dated October 29. Ms. Bruceri said that CBIA's estimate assumed that builders were not complying with the current Standards. The current Standards require all general lighting in the kitchen to be fluorescent. If the costs for compliance with the current kitchen lighting standards are backed out of CBIA's estimate, the additional cost due to the proposed standards would be only $212 per dwelling unit. Nevertheless, cost effectiveness analyses completed for the residential lighting requirements showed them to be very cost effective even if $400 was the assumed cost. She also pointed out that installing high efficacy lighting required the same labor as low efficacy lighting so there was no additional labor cost. Ms. Bruceri's letter walked through a cash flow analysis that showed if the cost of the high efficacy lighting was financed through a mortgage that mortgage costs would be dramatically less than the monthly energy bill savings making the house more affordable. Ms. Bruceri also responded to Mr. Sorensen's comments about air-tight fixtures by pointing out that insulated ceiling air-tight (ICAT) recessed fixtures are currently required by the Washington State Energy Code, the 1995 Model Energy Code and its successor, the 2000 International Energy Conservation Code. As a result the energy codes in 26 states require ICAT fixtures. Inspectors in these states have easily been able to make inspections of homes with ICAT fixtures. ICAT fixtures are labeled as such on the inside of the fixture so there is no need to remove the fixture for inspection and reinstall it after inspection. The air-tight requirement in the proposed Standards was found to be extremely cost effective. In a mature market where all fixtures are required to meet the Standards, the added cost for the air-tight fixture is expected to be negligible; that has been the experience in the Pacific Northwest.

The Energy Commission agrees with the responses that were made by Ms. Misti Bruceri representing Pacific Gas and Electric Company (PG&E) to Mr. Sorensen, and as a result decided to make no changes to the proposed residential lighting standards. The cost effectiveness analysis for the residential lighting provisions was properly done, and showed the provisions to be very cost effective even when the cost assumed that kitchen lighting does not comply with the current Standards. Mr. Sorensen's comments misinterpreted the requirements for air-tight fixtures, thinking that the inspector would have to remove sealing material used to seal the housing to the ceiling to verify compliance. As Ms. Bruceri pointed out, compliance will be determined by a label that will be visible on the inside of the fixture. Most fixtures are sealed to the ceiling with a gasket, but the Standards allow caulk to be used instead. It will be readily apparent whether a gasket or caulk has been used to do the housing-to-ceiling sealing.

DETERMINATION OF ALTERNATIVES CONSIDERED AND EFFECT ON PRIVATE PERSONS

The California Energy Commission has determined that no alternative considered or that has otherwise been identified and brought to the attention of the Commission would be more effective

in carrying out the purpose of the proposed Standards or would be as effective as and less burdensome to affected private persons than the proposed Standards.

The California Energy Commission has determined that energy bill savings substantially in excess of compliance costs will be received by private persons.

ALTERNATIVE LESSENING ADVERSE ECONOMIC IMPACTS ON SMALL BUSINESSES

The Standards will have no adverse impact on small business. On the contrary the Standards will reduce the energy bills of businesses that own and occupy buildings subject to the Standards by substantially more than the costs to install required measures, thereby increasing the profitability of these businesses. Also, the investment in cost effective energy efficiency measures will raise the property value of the buildings, providing a substantial return on investment at the point of resale. Businesses that provide energy efficiency products and services associated with the Standards requirements (many of them small businesses) will have expanded business opportunities. During the course of the proceeding the Energy Commission encouraged stakeholders to identify aspects of the Standards that might cause difficulties, and worked with commenters to identify and incorporate alternatives that could lessen any perceived difficulties. The following trade organizations and small businesses thanked the Commission for listening to issues they raised and revising the Standards to address their concerns: California Building Industry Association, California Association of Building Energy Consultants, National Electrical Manufacturers Association, North American Insulation Manufacturers Association, California Billboard Association, California Sign Association, Gardner Industries, Signtronix, Young Electric Sign Company, and APP-TECH, Inc.

COMMENTS MADE BY THE OFFICE OF SMALL BUSINESS ADVOCATE

None.

COMMENTS MADE BY THE TRADE AND COMMERCE AGENCY

None.